CHLORINATED SOLVENT DECISION TREE

Chlorinated Solvent Decision Tree Screening Questions

Is the area of groundwater contamination adequately defined?

- No → Decision Tree may be used to identify sampling needs. Plume boundary should be established prior to remedy selection
- Yes → Is DNAPL or contmainated fractured rock present or suspected in the treatment area?
  - Yes → Professional judgment should be used in application of Decision Tree
  - No → Are contaminant concentrations >1000x MCL?
    - Yes → Is a reduced remediation timeframe desired or needed?
      - Yes → THERMAL REMEDIES
        - *Note: Site specific evaluation of geology recommended to confirm selection of type of thermal method*
        - Is the water table shallow or is recharge to groundwater minimal?
          - Yes → Are groundwater flow rates low to moderate?
            - Yes → Consider Thermal Wells
            - No → Consider Electrical Resistance Heating
          - No → Consider Electrical Resistance Heating
      - No → OTHER ACTIVE REMEDIES
        - Is ORP >+100 mV?
          - Yes → ACTIVE REDUCING REMEDIES
            - Is pH = 6 or higher?[2]
              - Yes → Does water contain sulfate or nitrate?[1]
                - Yes → ACTIVE REDUCING REMEDIES with Nitrogen or Sulfate
                  - Is Nitrate >1 mg/l?[1]
                    - Yes → Is Sulfate >20 mg/l?[1]
                      - Yes → ERD-Caution! Not advisable! ZVI - Longevity estimates should be considered; additives to prolong life span recommended
                      - No → ERD-Pilot Study needed ZVI - Longevity estimates should be considered Consider Air Sparging
                    - No → Is Sulfate >20 mg/l?[1]
                      - Yes → ERD-Pilot Study needed ZVI - Longevity estimates should be considered Consider Air Sparging
                      - No → ZVI and ERD may be considered. Pilot study needed for ERD if pH<6
                - No → ZVI and ERD viable
              - No → Are petroleum products present?*
                - Yes → Does water contain sulfate or nitrate?[1]
                  - Yes → Successful Pilot Study needed before ERD should be considered
                  - No → Zero Valent Iron Recommended Successful Pilot Study needed before ERD should be considered
                - No → Zero Valent Iron Recommended Successful Pilot Study needed before ERD should be considered
          - No → Is ORP <-100mV?
            - Yes → ACTIVE REMEDIES FOR "NEUTRAL" ORP (Between –100 mV and +100 mV)
              - Is Sulfate >20 mg/l or Nitrate >1 mg/l?[1]
                - Yes → ACTIVE OXIDATION REMEDIES
                  - Is contaminated groundwater currently discharging to surface water?
                    - Yes → Ozone Sparging or Air Sparging viable
                    - No → Are there impacted public or private wells or irrigation wells?
                      - Yes → Ozone Sparging or Air Sparging viable
                      - No → Is there a potential for contaminated groundwater to enter surface water, a private or public well, or an irrigation well?
                        - Yes → Ozone Sparging and Air Sparging are viable options. ISCO may be considered with evaluation of travel times to nearest receptor and amendment longevity. Bench scale and pilot scale testing recommended to confirm longevity and effectiveness of amendment.
                        - No → ISCO should be considered. Ozone, permanganate, Fenton's, persulfate,and other amendments available; pilot or bench -scale study may be performed to help select Amendment
                - No → Is pH = 6 or higher?[2]
                  - Yes → Most technologies Viable; ERD needs Pilot Study
                  - No → Most technologies Viable; ERD needs Pilot Study
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      - Yes → PASSIVE REMEDIES
        - Is a reduced time frame to meet goals needed or desired?
          - Yes → Are nearby wells or surface water impacted by contaminants, or is there a potential for existing contaminated groundwater to impact a surface water body or a well above applicable criteria?
            - Yes → Is water table shallow?
              - Yes → Phytoremediation or MNA viable
              - No → Consider MNA
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    - No → Are contaminant concentrations between 50 and 1000x MCL?
      - Yes → Is a reduced remediation timeframe desired or needed?
        - Yes → THERMAL REMEDIES
          - *Note: Site specific evaluation of geology recommended to confirm selection of type of thermal method*
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Note: For additional information, please refer to the Entire Chlorinated Solvent Decision Tree Document